

DEVELOPMENT OF THE ITER SYNTHETIC REFLECTOMETRY DIAGNOSTIC

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Abstract

Reflectometry will be used in ITER to measure the electron density profile and to provide key information of the density fluctuations. There are two reflectometry systems, one at the high magnetic field side (HFS) and one at the low field side (LFS).

The synthetic diagnostic (SD) for both reflectometry systems is being developed, with a goal of modelling the reflected signals for ITER baseline discharges. The estimation of the core and edge density profile will be simulated using the HFS and the LFS SD reflectometers, correspondingly. The paper describes a structure of the SD reflectometry, which consists of blocks, representing different parts of the real diagnostic scheme. There are modules that include simulation of a microwave source, a single side band modulator, frequency multipliers, a transmission line, an IQ detector, analog-to-digital converters, antenna, augmented along with a plasma-wave interaction modelling and the data processing.

The tasks of the reflectometry synthetic diagnostics involve evaluation of optimum measurement parameters and techniques for different plasma scenarios, development & optimization of data analysis algorithms and simulation of data reconstruction incorporated to the ITER modelling database (IMAS). Results of this work will contribute to the optimization of reflectometry systems measurement capabilities, which is important for ITER plasma control and operation, as well as for physics study.

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